

Session 9 Overview

Display Drivers

Chair: Oh-Kyong Kwon, Hanyang University, Seoul, Korea

Associate Chair: Tiemin Zhao, Reflectivity, Sunnyvale, CA

At a growth rate of greater than 20% per year, displays are the fastest growing segment of the electronics industry. Ranging from cell phones to 60-inch televisions, consumers are demanding higher resolution, higher color depth, and lower cost. Innovations in the drive electronics for both traditional TFT-LCD displays as well as emerging technologies such as active matrix organic LEDs (AMOLEDs) address this demand.

The first paper, 9.1, describes a power-speed optimized topology for a quarter VGA TFT-LCD display. It produces 12 channels with 256 gray levels for each.

In the second paper, 9.2, an AMOLED display driver is described; it drives the display matrix with current. This eliminates the lifetime and temperature issues associated with the diode I/V relationship when using a voltage drive. The design obtains accuracies of better than 2% (at 10nA) using a common current-mode DAC and a linear array of current copiers.

The third paper, 9.3, uses thin film transistor CMOS devices to create a 6-bit TFT-LCD column driver on a glass substrate. Significant cost savings are achieved by eliminating the printed circuit board and tape automated bonding required for crystalline silicon drivers. The design used copper plating to obtain low-resistance interconnections for critical signals.





9.1 A 250 μ W 0.042mm² 2MS/s 9b DAC for Liquid Crystal Display Drivers
J. Knausz, National Semiconductor, Pittsford, NY

8:30 AM

The architecture and design methods are presented for implementing N-bit DACs optimized for small-format LCD column drivers. Individual 9b DACs in a 12-channel QVGA display system occupies a die area of 0.042mm². It represents a composite DAC performance of better than 0.60pJ/b/mm².



9.2 A Current Driver IC Using a S/H for QVGA Full-Color Active-Matrix Organic LED Mobile Displays
J.-H. Baek, Samsung, Yongin-City, Korea

9:00 AM

A current driver with 720 outputs for active-matrix organic LEDs uses a current-copier scheme to produce 64 gray levels with maximum 2% error from 10nA to 10 μ A on a 19.2x17.8mm² die.

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9.3 Panel-Sized TFT-LCD Column Driver
O. Ishibashi, NEC, Sagamihara, Japan

9:30 AM

Panel-sized TFT-LCD column drivers have been fabricated on a glass substrate with TFT CMOS and low-resistivity copper-plated interconnections. These operate with a 16.25MHz internal clock, have 6b DACs, 6b accuracy with either 3072 or 1536 outputs, and use an offset-controlled amplifier. The operation of 15 inch XGA LCDs is demonstrated using panel-sized column drivers.